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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/564,794	12/11/2006	Ralf Zuber	Umicore 0155-US	3335
80336	7590	05/20/2011		
Levin Santalone LLP 2 East Avenue Suite 201 Larchmont, NY 10538			EXAMINER WILLS, MONIQUE M	
			ART UNIT	PAPER NUMBER
			1728	
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			05/20/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/564,794	ZUBER ET AL.	
	Examiner	Art Unit	
	MONIQUE WILLS	1728	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 May 2011.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 23-29,31,34-37,41-43 and 45-47 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 23-29,31,34-37,41-43 and 45-47 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 December 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Request for Continued Examination

The request filed on **May 16, 2011** for a Request for Continued Examination (RCE) under 37 CFR 1.114 based on parent Application No. 10/564,794 is acceptable and a RCE has been established. An action on the RCE follows.

The following rejections are overcome:

- Claims 23-24, 25-28, 29-31 & 33-34, 38-47 under 35 U.S.C. 103(a) as being unpatentable over Nanaumi et al. U.S. Pub. 2003/0049518 in view of Brunk et al. U.S. Pat. 7,267,902.
- Claims 32 & 35-37 under 35 U.S.C. 103(a) as being unpatentable over Nanaumi et al. U.S. Pub. 2003/0049518 in view of Nanaumi et al. U.S. Pub. 2003/0049518 in view of Brunk et al. U.S. Pat. 7,267,902 and further in view of Biegert U.S. Pub. 2003/0049367.

Claims 23-25, 27-29, 31, 34-37, 41-43, 45-47 are newly rejected as follows:

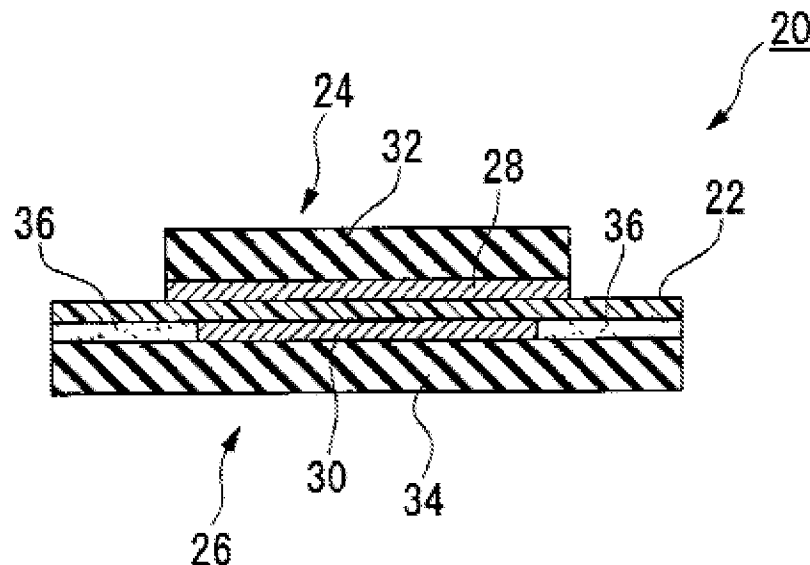
Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 23-24, 25-28, 29-31 & 33-34, 38-45, 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nanaumi et al. U.S. Pub. 2003/0049518 in view of Elmore et al. U.S. Pub. 4,786,568 and further in view of Yandrasits et al. U.S. Pub. 2005/0263246 .

With respect to **claim 23**, Nanaumi teaches a membrane electrode unit for electrochemical equipment, containing an ionically conductive membrane with a front and back side, a first catalyst layer and a first gas distributor substrate on the front side and a second catalyst layer and a second gas distributor substrate on the back side, in which the first gas distributor substrate has lesser surface dimensions than the ionically conductive membrane and the second gas distributor substrate has essentially the same surface dimensions as the ionically conductive membrane. See paragraph 6.



With respect to **claim 24**, the catalyst layer on the front side and the catalyst layer on the back side of the ionically conductive membrane have different size dimensions. See paragraph 16. With respect to **claim 26**, the ion-conducting membrane (22) is not supported by the gas diffusion layer on the front side (32). See Figure 1. With respect to **claim 27**, the catalyst layers on the front side and on the back side contain catalyst containing noble metals such as platinum and optionally ionically conductive materials. See paragraph 48. With respect to **claim 29**, the gas distributor substrate comprises porous electrically conductive carbon cloth. See paragraph 48. With respect to **claim 30**, the edge of the first gas distributor substrate and the portion of the front side of the ionically conductive membrane not supported by the first gas distributor substrate are surrounded by a sealing material. See paragraphs 24, 60 and Figure 7. With respect to **claims 33 & 34**, the sealing material is integrally combined with another peripheral plastic frame. See paragraph 24 and Figure 7. With respect to **claims 38-44**, the claim limitations are process claims further defining the product.

[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” In re Thorpe, 777F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). Here, the membrane electrode assembly taught by Nanaumi has the same structure as the present invention.

Nanaumi does not expressly disclose that the peripheral edges of the ion-conducting membrane not supported by the gas diffusion layer and the edges of the gas diffusion layer are enclosed by a sealing material which comprises a thermoplastic polymer and reinforced by an electrically insulating inorganic material (**claim 23**); wherein the electrically insulating inorganic material is chemically inert (**claim 45**); present in a weight percent of 10 to 30 wt% (**claim 47**). The reference does not disclose that the catalyst has the same size on both sides of the membrane (**claim 25**); that the membrane has a thickness of 10 to 200 microns (**claim 28**) or that the sealing material impregnates an edge region to a depth of at least 0.5 mm (**claim 31**).

Elmore teaches that it is well known in the art to employ thermosetting polymer (fluorocarbon binder) and inorganic layer around the peripheral edges of gas diffusion layers. See column 5, lines 55 to col. 6 line 5. With respect to **claims 45**, the electrically insulating organic material is chemically inert because carbon black and silicon carbide are stable in fuel cells (see column 5, lines 55-61). It would be reasonable to expect the sealing material to be chemically inert in order to provide an effective seal.

Yandrasits teaches that it is well known in the art to employ sealing material in the edges of members. See paragraphs 20 & 33 where the perforations (70) of the catalyst membrane (10) are filled with sealing material in order to seal adjacent electrodes.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to seal the peripheral edges of Nanuami with a thermoplastic/inorganic material sealant, as taught by Elmore, in order to provide fluid impermeable seals that prevent electrical contact between gas diffusion layers. The skilled artisan recognizes the importance of the structural integrity of the seals in order to obviate leakage.

With respect to sealing the peripheral edge of the membrane, it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to impregnate the peripheral edge of the membrane as taught by Yandrasits, in the fuel cell of Nanuami in view of Elmore, in order to improve the bond seal between electrodes circumscribing the membrane. The skilled artisan recognizes that it will obviate leakage and prevent de-lamination of the electrodes.

With respect to **claim 25**, it would have been obvious to one of ordinary skill in the art at the time the instant invention was employ catalyst of the same size on both sides of the membrane of Nanaumi, since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. In re Rose, 105 USPQ 237 (CC)A

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1955). The skilled artisan recognizes that catalyst size directly effects electrochemical activities.

With respect to the thickness of the membrane (**claim 28**), it would have been obvious to one of ordinary skill in the art at the time the instant invention was employ a thickness of 10 to 200 microns in the membrane of Nanaumi, since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. In re Rose, 105 USPQ 237 (CC)A 1955). The skilled artisan recognizes that that thickness of the membrane directly effects ion transport.

With respect to the sealing material impregnating the edge region of the substrate to a depth of 0.5mm (**claim 31**), it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to employ the instant sealing depth in the membrane electrode assembly of Nanaumi, in order to increase structural integrity of the seal.

With respect to **claim 47**, it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to employ the inorganic material with percent of 10 to 30 Elmore, to support the gas diffusion layer of Nanaumi, in order to properly insulate the gas diffusion layers. The skilled artisan recognizes that varying amounts of glass fibers will directly effect insulation between electrodes.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nanaumi et al. U.S. Pub. 2003/0049518 in view of Elmore et al. U.S. Pub. 4,786,568 and further in view of Yandrasits et al. U.S. Pub. 2005/0263246 and even further in view of Komura et al. U.S. Pub. 2004/0142228. .

Nanaumi in view of Elmore, Yandrasits and teach a fuel cell wherein the peripheral edge of the gas diffusion layer and membrane are impregnated with a thermoplastic sealant reinforced with an inorganic material.

However, Nanaumi does not expressly disclose the inorganic material including glass fibers.

Komura teaches that it is well known in the art to employ thermoplastic seals reinforced with glass fibers to provide effective seals.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to employ the glass fiber seal of Komura to seal the fuel cell components of Nanaumi in order to increase structural integrity of the seals.

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The skilled artisan recognizes that glass reinforced provide low cost seals with high rigidity.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 32 & 35-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nanaumi et al. U.S. Pub. 2003/0049518 in view of Nanaumi et al. U.S. Pub. 2003/0049518 in view of Elmore et al. U.S. Pub. 4,786,568 and further in view of Yandrasits et al. U.S. Pub. 2005/0263246 and even further in view of Biegert U.S. Pub. 2003/0049367.

Nanaumi in view of Elmore and Yandrasits teach a membrane electrode assembly as described in the rejection recited hereinabove, including fluorine and silicon sealing agents. See paragraph 51.

However, Nanaumi does not disclose: thermoplastic seals such as polyamides (**claim 32**); a creep-resistant polymer joined by an adhesive (**claim 35**); having a glass transition temperature (T_g) above 100C (**claim 36**) or an polyethylene adhesive (**claim 37**).

Biegert teaches that it is well known in the art to seal polymer electrolyte membranes with polyamides, because they remain stable at temperatures up to 120 degrees. See paragraph 50. The sealing may contain an additional seal or adhesive such as polyethylene. See paragraph 50.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to employ the polyamide of Biegert, to seal the fuel cell of Nanaumi in view of Elmore and Yandrasits, because polyamides will remain stable at high temperatures, thus providing adequate seals in harsh electrochemical environments. The limitations with respect to a creep resistant polymer (claim 35) having a glass transition temperature (T_g) above 100C (claim 36) is satisfied, as Biegert teaches the same polyamide set forth by Application. On page 12, lines 25-35 of the instant specification, polyimide is a creep resistant polymer having the instant glass transition temperature requirement.

With respect to the polyethylene adhesive, it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to employ the polyethylene adhesive of Biegert, to join the seal of Nanaumi, Elmore and Yandrasits, in order to improve structural integrity of the fuel cell seals. The skilled artisan recognizes that seals provide gas barriers and obviate leakage of harsh electrochemicals in to the environment.

Response to Arguments

Applicant asserts that Nanaumi does not expressly disclose the newly added limitation requiring that the surface of the ion-conducting membrane not supported by the gas diffusion layer and the edges of the gas diffusion layer are enclosed by a sealing material which comprises a thermoplastic polymer and reinforced by an electrically insulating inorganic material. This assertion is correct and the all previously pending rejections are overcome.

Conclusion

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Monique Wills whose telephone number is (571) 272-1309. The Examiner can normally be reached on Monday-Friday from 8:30am to 5:00 pm.

If attempts to reach Examiner by telephone are unsuccessful, the Examiner's supervisor, Jennifer Michener, may be reached at 571-272-1424. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Monique M Wills/

Examiner, Art Unit 1728

/Jennifer K. Michener/
Supervisory Patent Examiner, Art Unit 1728